

THE UNIVERSITY OF CHICAGO
Graduate School of Business
Business 41202, Spring Quarter 2007, Mr. Ruey S. Tsay

Homework Assignment #1

Due Date: before class

- Campus class: April 6, 2007
- Weekend class: April 7, 2007

Data files: Datasets may be downloaded from the course web site.

Assignment:

1. Consider the daily stock return of the Chicago Mercantile Exchange Holding Inc. (tick symbol CME) and the S&P 500 Composite index from January 2004 to December 2006. The data are simple returns and in the file d-cmesp0406.txt (three columns with date, CME, SP).
 - Express the simple returns of CME stock in percentages. Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of the percentage simple returns.
 - Transform the simple returns of CME to log returns and express the log returns in percentages. Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of the percentage log returns.
 - Is the sample mean of CME log returns statistically different from zero? Use 5% significance level to draw your conclusion.
 - Consider the simple returns of CME and S&P500 index. Is there any difference between the two average returns? Again, you may use the 5% significance level to answer the question.
2. Consider the monthly simple returns for American International Group Inc. stock (tick symbol AIG), the CRSP value-weighted index (vw), CRSP equal-weighted index (ew) and S&P composite index from January 1980 to December 2006. The returns include dividend distributions, and the data file is m-aigvwewsp8006.txt. Transform the simple returns to log returns and express the log returns in percentages. Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each percentage log-return series.
3. Consider the weekly 3-month Treasury bill rates on the secondary market from January 8, 1954 to March 16, 2007. The data file consists of year, month, day, and rate. Answer the following questions:
 - Compute the mean, standard deviation, skewness, and kurtosis of the interest rate series.

- Compute the change series of interest rate, i.e. $x_t = y_t - y_{t-1}$ with y_i being the i th observation of the interest rate. Compute the mean, standard deviation, skewness, and kurtosis of the change series.
 - Obtain an empirical density function of the x_t series. Is the density function symmetric with respect to its mean? [You may use the 5% significance level to answer this question.]
4. Consider the daily log returns of CME stock from January 2004 to December 2006 as in Problem 1. Use the 5% significance level to perform the following tests: (a) Test the null hypothesis that the skewness measure of the returns is zero; (b) Test the null hypothesis that the excess kurtosis of the returns is zero; (c) Test the null hypothesis that the log returns is normally distributed. You may use the Jarque-Bera test.
 5. Daily foreign exchange rates (noon buying spot rates) are obtained from the Federal Reserve Bank at St. Louis. Consider the exchange rates of US Dollar-Euro and US Dollar-JP Yen from January 4, 1999 to March 20, 2007. The data files consist of year, month, day, and rate. (a) Compute the daily log return of each exchange rate, (b) Compute the sample mean, variance, skewness, excess kurtosis, minimum, and maximum of each log return series. For Japan, the exchange rate is yens per U.S. dollar. For Euro, the exchange rate is U.S. dollars per Euro. (c) What is the correlation between the two log return series of exchange rate?

Reading assignment: Chapter 1 and Chapter 2 (Sections 1 to 5) of the text.